

5 CLAIMS :

1. A lubricating oil of reduced crystal formation potential attributable to the interaction of sulfur phosphorus containing anti-wear/extreme pressure agents and hindered phenolic antioxidants comprising a major amount of a base oil of lubricating viscosity and having less than about 99 wt% saturates content, and a minor amount of additive comprising a sulfur-phosphorus containing anti-wear/extreme pressure additive, a hindered phenol antioxidant and a high molecular weight di- or poly- carboxylic acid, anhydride or mixture thereof provided at least 0.0013 wt% high molecular weight carboxylic acid, anhydride or mixture thereof is present for each 1 ppm phosphorus attributable to the sulfur phosphorus containing anti-wear/extreme pressure agent.
2. The lubricating oil of claim 1 wherein the sulfur-phosphorus anti-wear/extreme pressure agent is in an amount sufficient to provide about 2 ppm to 320 ppm phosphorus, the hindered phenol antioxidant is at a concentration of from about 0.01 to 2.0 wt% based on active ingredient and the high molecular weigh di- or poly-carboxylic acid is at a concentration of in the range of about 0.0026 to 0.8 wt% based on active ingredient.
- 25 3. The lubricating oil of claim 1 or 2 wherein the sulfur-phosphorus containing anti-wear/extreme pressure agent is in an amount sufficient to provide from 40 ppm to 200 ppm phosphorus.
4. The lubricating oil of claim 1 or 2 wherein the sulfur-phosphorus containing anti-wear/extreme pressure agent is in an amount sufficient to provide from 80 ppm to 130 ppm phosphorus.

5        5. The lubricating oil of any preceding claim wherein the hindered phenol is at a concentration of about 0.1 to 1.0 wt% based on active ingredient.

10      6. The lubricating oil of claim 2, 3 or 4 wherein the hindered phenol is at a concentration of about 0.3 to 0.5 wt% based on active ingredient.

15      7. The lubricating oil of claim 2, 3 or 4 wherein the high molecular weight di- or poly-carboxylic acid, anhydride or mixture thereof is at a concentration of about 0.08 to 0.4 wt% based on active ingredient.

20      8. The lubricating oil of any preceding claim wherein the high molecular weight di- or poly-carboxylic acid anhydride or mixture thereof is at a concentration of about 0.12 to 0.24 wt% based on active ingredient.

25      9. The lubricating oil of any preceding claim wherein the high molecular weight di- or poly-carboxylic acid, anhydride mixture thereof is a polyhydrocarbylene substituted di- or poly-carboxylic acid, anhydride or mixture thereof wherein the polyhydrocarbylene group has a molecular weight in the range 300 to 5,000.

30      10. A method for reducing crystal formation in lubricating oil containing a mixture of sulfur phosphorus anti-wear/extreme pressure agent and hindered phenols antioxidant wherein the sulfur-phosphorus anti-wear/extreme pressure agent interacts with the phenolic antioxidant to produce crystals, such method comprising adding to a major amount of a base oil of lubricating viscosity having a saturates content of less than 99 wt%, a minor amount of additives comprising a sulfur-phosphorus containing anti-wear/extreme pressure agent a hindered phenol antioxidant and a high molecular weight di- or poly-carboxylic acid, anhydride or mixture thereof provided at least 0.0013 wt% of

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- 5 the high molecular weight di- or poly-carboxylic acid, anhydride or mixture thereof is used for each 1 ppm phosphorus attributable to the sulfur-phosphorus containing anti-wear/extreme pressure agent.